CLAIMS

What is claimed is:

1. A continuous form microstructure array device comprising an elongate film laminate having a width bounded by first and second edges and a length bounded by first and second ends, said elongate film laminate having a plurality of microstructures arranged therein, each said microstructure configured to carry out at least one step in a microfluidic process.

2. The continuous form microstructure array device of claim 1, wherein said plurality of microstructures is arranged as a plurality of microstructure arrays comprising a set of microchannels configured to carry out a set of microfluidic process steps.

3. The device of claim 1 wherein said elongate film laminate comprises a first lamina and said microstructures comprises at least one microchannel formed in said first lamina.

4. The device of claim 3 wherein said elongate lamina further comprises a second lamina having a surface affixed to said first lamina, said second lamina enclosing at least part of said microchannel.

5. The device of claim 1 wherein said elongate film laminate comprises a spacing lamina sandwiched between first and second enclosing laminae and each said microstructure comprises at least one microchannel formed as a slit through said spacing lamina, said enclosing laminae enclosing at least a part of said microstructure.

6. The device of claim 3, further comprising a flexible circuit laminate adjacent said first lamina, said flexible circuit laminate comprising at least one electrode configured to contact an electroflow medium when such medium is supplied to said microstructure.

7. A method for making a laminate device having a plurality of microstructures therein, each said microstructure being configured to carry out at least one step in a microfluidic process, said method comprising the steps of forming said microstructures in a

first lamina having a first surface, providing a second lamina having a second surface, creating a plurality of openings in at least one of the first and second lamina, and apposing the first surface of the first lamina and the second surface of the second lamina to form a laminate structure, wherein each said opening is in fluid communication with one of said microstructures.

8. The method of claim 7, further comprising the step of apposing a surface of a flexible circuit laminate adjacent said first lamina, said flexible circuit laminate comprising a plurality of electrodes, wherein each said electrode is configured to contact an electroflow medium when such medium is supplied to said microstructure.

9. The method of Claim 7 wherein said forming step includes the step of embossing the first lamina to form said microstructures therein.

10. The method of Claim 9 wherein said forming step includes the step of curing the first lamina after the embossing step.

11. The method of Claim 7 further comprising the step of supplying the first lamina from a first roll and supplying the second lamina from a second roll in a continuous feed operation.

12. The method of Claim 11 further comprising the step of cutting the laminate structure to form a plurality of discrete devices each having a plurality of microstructures thereon.

13. A method for carrying out a microfluidic process, said method comprising the steps of providing a film laminate having a plurality of microstructures arranged therein, each said microstructure being configured to carry out at least one step in the microfluidic process, each said microstructure comprising a detection region, providing a detector capable of detecting a signal produced in the course of said step in said microfluidic process, causing relative movement between said film laminate and said detector to bring said detection region into the detection field of said detector.

14. A device for carrying out a microfluidic process, said device comprising

an elongate film laminate having a plurality of microstructures arranged therein, each said microstructure being configured to carry out at least one step in the microfluidic process, each said microstructure comprising a detection region,

a detector capable of detecting a signal produced in the course of said step in said microfluidic process,

means for moving said elongate film laminate or said detector in relation to each other to bring said detection region into the detection field of said detector.

15. A microstructure device for use with first and second contact probes extending from an electrode support structure in a predetermined pattern comprising a laminate structure having a first lamina of a plastic material, the first lamina having first and second spaced-apart parallel surfaces, the first lamina being provided with at least one microstructure extending in a direction parallel to the first and second parallel surfaces, the laminate structure having first and second spaced-apart wells adapted to receive a fluid and in fluid communication with the at least one microstructure, the laminate structure having a second lamina of a nonconductive material, electrical means at least partially carried by the second lamina for each of the first and second wells, each of the electrical means having an electrode portion in communication with the fluid of the respective well and a contact portion spaced apart from the respective well and not in fluid communication with the fluid of the respective well, the contact portions being arranged on the laminate structure in a pattern corresponding to the predetermined pattern of contact probes whereby the first and second contact probes can be brought into contact with the respective contact portions so as to provide a desired voltage potential to the fluid provided in the first and second wells.

16. The device of Claim 15 wherein each contact portion is accessible from the exterior of the laminate structure.

17. The device of Claim 16 wherein the second lamina has first and second spaced-apart parallel surfaces, each electrode portion being adjacent to the first surface of the second lamina and each contact portion being adjacent the second surface of the second lamina.

18. The device of Claim 17 wherein each of the first and second electrical means extends between the first and second surfaces of the second lamina so that each contact portion underlies the respective electrode portion.

19. The device of Claim 16 wherein each of the first and second electrical means includes a trace portion which electrically connects the contact portion to the electrode portion.

20. The device of Claim 19 wherein the electrode portion of each of the first and second electrical means is disposed at a bottom of a respective well.

21. The device of Claim 20 wherein the second lamina has first and second spaced-apart parallel surfaces, each electrode portion being adjacent to the first surface of the second lamina, each contact portion being adjacent to the second surface of the second lamina and each trace portion extending transversely between the first and second surfaces of the second lamina.

22. The device of Claim 16 wherein the laminate structure has first and second spaced-apart parallel surfaces, each of the first and second wells being accessible from the first surface and each of the contact portions of the first and second wells being accessible from the second surface.

23. The device of Claim 16 wherein the laminate structure has first and second spaced-apart parallel surfaces, each of the first and second wells and each of the contact portions of the first and second wells being accessible from the first surface.

24. The device of Claim 15 for use with first and second piercing contact probes wherein the second lamina is made of a material which permits the first and second piercing contact probes to penetrate the second lamina so that the first and second piercing contact probes electrically engage the contact portions of the first and second electrical means.

25. The device of Claim 16 wherein the laminate structure has a third lamina overlying the first and second wells for sealably enclosing the fluid in the first and second wells.

26. The device of Claim 15 for use with additional first and second contact probes wherein the first lamina is provided with an additional microstructure and the laminate structure has additional first and second spaced-apart wells in fluid communication with the additional microstructure, additional first and second electrical means at least partially carried by the second lamina for the additional first and second wells.

27. The device of Claim 15 for use with an additional first and second contact probes wherein the first lamina is provided with an additional microstructure, the laminate structure has additional first and second spaced-apart wells in fluid communication with the additional microstructure and the laminate structure has a third lamina of a nonconductive material disposed adjacent the second lamina, additional first and second electrical means at least partially carried by the third lamina for the additional first and second wells.

28. The device of Claim 27 wherein the second lamina overlies the first lamina and the third lamina overlies the second lamina.

29. The device of Claim 28 wherein the first and second wells and the additional first and second wells extend through the second lamina and the third lamina.

30. The device of Claim 15 wherein the first and second wells extend through the second lamina.

31. The device of Claim 30 wherein at least one of the electrode portions is annular in shape and extends around the respective well.

32. A microstructure device for use with first and second contact probes extending from an electrode support structure in a predetermined pattern comprising a laminate structure having an exterior and a first lamina of a plastic material, the first lamina having first and

second spaced-apart parallel surfaces, the first lamina being provided with first and second microstructures extending in a direction parallel to the first and second parallel surfaces, the laminate structure having first and second wells adapted to receive a fluid, the first well being in fluid communication with the first microstructure and the second well being in fluid communication with the second microstructure, the laminate structure having a second lamina and a third lamina each of a nonconductive material, first electrical means at least partially carried by the second lamina for the first well and second electrical means at least partially carried by the third lamina for the second well, each of the electrical means having an electrode portion in communication with the fluid of the respective well and a contact portion spaced apart from the respective well and not in communication with the fluid of the respective well, the contact portions being arranged on the laminate structure in a pattern corresponding to the predetermined pattern of contact probes whereby the first and contact probes can be brought into contact with the respective contact portions so as to provide a desired voltage potential to the fluid provided in the first and second wells.

33. The device of Claim 32 wherein the second lamina overlies the first lamina and the third lamina overlies the second lamina.

34. The device of Claim 33 wherein the first and second wells extend through the second lamina and the third lamina.

35. The device of Claim 34 wherein at least one of the electrode portions is annular in shape and extends around the respective well.

36. The device of Claim 33 wherein each of the first and second electrical means includes a trace portion which electrically connects the contact portion to the electrode portion, the trace portion of the second electrical means overlying the trace portion of the first electrical means and being electrically insulated from the trace portion of the first electrical means by the third lamina.

37. The device of Claim 32 wherein the laminate structure has a fourth lamina overlying the first and second wells for sealably enclosing the fluid in the first and second wells.

38. A microstructure device for use with first and second contact probes extending from an electrode support structure in a predetermined pattern comprising a laminate structur having a first lamina of a plastic material, the first lamina having first and second spaced-apart parallel surfaces and being provided with at least one microstructure extending in a direction parallel to the first and second parallel surfaces, the laminate structure having a second lamina of a nonconductive material, the second lamina having first and second spaced-apart surfaces and being provided with a plurality of spaced-apart bores extending through its first and second parallel surfaces for forming at least a portion of a plurality of wells adapted to receive a fluid and in fluid communication with the at least one microstructure, electrical means carried by the laminate structure for each of the plurality of wells, each of the electrical means having an electrode portion in communication with the fluid of the respective well and a contact portion spaced apart from the respective well and not in fluid communication with the fluid of the respective well, the contact portions being arranged on the laminate structure in a pattern corresponding to the predetermined pattern of contact probes whereby the first and second contact probes can be brought into contact with the contact portions so as to provide a desired voltage potential to the fluid provided in the plurality of second wells.

39. The device of Claim 33 wherein the first lamina is provided with an additional such microstructure and the second lamina is provided with an additional plurality of such spaced-apart bores for forming at least a portion of an additional plurality of wells in fluid communication with the additional microstructure, additional such electrical means carried by the laminate structure for each of the additional plurality of wells, the additional electrical means overlying the first-named electrical means and being electrically insulated from the first-named electrical means.

40. The device of Claim 39 wherein the laminate structure includes a third lamina of a nonconductive material disposed between the first-named and additional electrical means.

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